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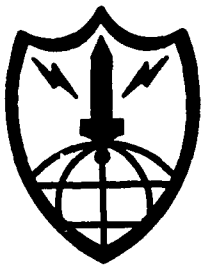

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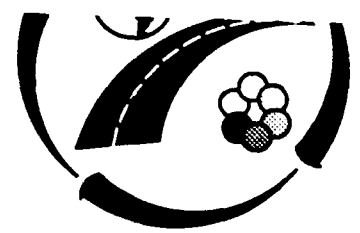

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This report details the research efforts into the SQL Ada Module Database Description Language (SAMeDL). Four compilers are presented (Oracle, Informix, XDB, and Sybase) that allow Ada application programs to access database using a standard SQL query language. Copies of the compiler can be obtained from the DoD Ada Joint Program Office 703/614-0209.

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SAMeDL Development Environment
User Manual

(XDB/386PC/Interactive UNIX/Alsys)

Intermetrics, Inc.

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Chapter 1 About This Manual

1.1 Purpose

The purpose of this manual is to describe the features of the Intermetrics' SAMeDL Development Environment (SDE) for the XDB Database Management System on the 386PC platform with Interactive UNIX and Alsys Ada. The language supported is defined in the *SAMeDL Language Reference Manual* **[LRM]**. This user's manual is not intended to be a language tutorial for SAMeDL. In addition, it is assumed that you have an underlying working knowledge of XDB **[XDB]** and the Ada standard **[Ada]**.

1.2 Organization

The organization of this document is as follows:

- Chapter 2, *SDE Overview*, briefly describes the SDE components, what each component is used for, and how the components relate to each other.
- Chapter 3, *SDE Library File System*, contains an overview of libraries and how SDE uses them.
- Chapter 4, *Getting Started With SDE*, demonstrates a simple scenario, providing enough information for users to get started developing Ada/SQL interfaces with SAMeDL.
- Chapter 5, *Building Ada/SQL Interfaces With SAMeDL*, provides detailed information on how to generate Ada/SQL interfaces using the SAMeDL compiler, and also outlines the procedures that should be followed for including generated interfaces in an Ada application program.
- Chapter 6, *Implementation Dependent Features*, discusses SAMeDL features which are dependent on the XDB DBMS implementation.
- Chapter 7, *Tool Limitations*, outlines general restrictions and tool limitations imposed by the current release of the SAMeDL Development Environment for XDB/386PC/Interactive UNIX/Alsys.
- Chapter 8, *SDE Command Reference Manual Pages*, contains a detailed reference for each command in SDE.

1.3 Syntax Conventions

The following explains the notational conventions used in SDE command syntax throughout this document:

xyz Items expressed in lower-case italic letters are used to represent user-supplied names. You should substitute an appropriate value. For example,

```
pathname
```

would mean that you should specify the text that represents a file or directory pathname.

[] Brackets are used to denote items that are optional. For example,

```
sde.cleanlib [pathname]
```

means that you may specify the command with or without supplying a *pathname*.

... An ellipsis indicates that you may optionally repeat the preceding item one or more times. For example,

```
module_name ...
```

means that a series of module names can follow the one listed.

Unless otherwise noted, you may specify options on a SDE command in any order. Also, option keywords are not case sensitive and may be truncated as long as the resulting abbreviation is unambiguous. For example, the following two commands are equivalent:

```
sde.ls -l my_library -v my_def_module
sde.ls -Verbose -Library my_library my_def_module
```

1.4 References

[Ada] *Reference Manual for the Ada Programming Language*, Ada Joint Program Office, 1983.

[AdaRef] *FirstAda Ada Software Engineering Environment: Application Developer's Guide and Appendix F version 4.4*, Alsys, Inc, 1990.

[LRM] *SAMeDL Language Reference Manual*, Intermetrics, Inc., IR-VA-011-1, 07 July 1992.

[SAMEGuide] *Guidelines for the Use of the SAME*, Marc Graham: Software Engineering Institute/Carnegie Mellon University, Technical Report CMU/SEI-89-TR-16, May 1989.

[SDEInst] *SAMeDL Development Environment Installation Guide*, Intermetrics, Inc., IR-VA-026-2, 01 September 1992.

[sqlmc] *XDB Ada SQL Module Compiler User's Guide*, Computer Associates Int'l, Inc., 1989.

[XDB] *XDB User's Manual*, XDB Systems, Inc., 1989.

Chapter 2 SDE Overview

The SAMeDL Development Environment (SDE) provides you with a software environment for developing Ada/SQL interfaces through the use of SAMeDL. The SDE toolset consists of a compiler, which processes SAMeDL source files to generate Ada/SQL interfaces, and the Module Manager, which assists you with SDE library management and other facets of interface development.

The SDE toolset includes the following:

samedl	invoke the SAMeDL compiler
sde.cleanlib	reinitialize an SDE library
sde.creatlib	create an SDE library
sde.ls	list compiled SAMeDL modules
sde.mkscript	generate an Ada compilation script file for an interface file
sde.purge	remove out of date files from an SDE library
sde.rm	remove a SAMeDL module from an SDE library
sde.rmlib	remove an SDE library

2.1 The SDE SAMeDL Compiler

The SAMeDL compiler processes SAMeDL source files and generates interface files representing the prescribed Ada/SQL interface.

Like an Ada compiler which deals with compilation units, the SAMeDL compiler works with *modules*, which are the smallest pieces of code that can be successfully compiled and shared. A SAMeDL source file may consist of one or more modules.

In SAMeDL, there are three types of modules. A module may be either a definitional module containing shared definitions, a schema module containing table, view, and privilege definitions, or an abstract module containing local definitions and procedure/cursor declarations.

The SAMeDL compiler will generate interface files for each definition module (in the form of an Ada package specification/body pair) and each abstract module (in the form of a layered interface consisting of an Ada package specification/body pair, an Ada SQL Module file, and an Ada package specification/body pair generated from the Ada SQL Module). No interface files are generated for schema modules. The generated interface files collectively represent the Ada/SQL interface you would use in your Ada application program.

SAMeDL is analogous to Ada in that it also has the concept of *separate compilation*. SAMeDL modules may use (through the use of *context clauses*) information contained in other modules that you have previously compiled. All separate compilation information is kept in ordinary host file system directories and files. These files/directories along with any generated interface files are organized into an SDE *library*, which again is somewhat similar to the development library concept used by most Ada development systems.

As in the case of most language compilers, the SAMeDL compiler will perform the appropriate syntactic and semantic error checking. All error messages are reported to the standard output device. You may also optionally specify that a source listing file be generated in which case, if you had any errors, the errors would be interleaved with the SAMeDL source code in your listing.

2.2 The SDE Module Manager

The SDE Module Manager is a set of tools which you may use to assist with SDE library management and other facets of interface development. These tools include **sde.cleanlib, sde.creatlib, sde.ls, sde.mkscript, sde.purge, sde.rm,** and **sde.rmlib.**

sde.cleanlib

sde.cleanlib will allow you to empty an existing SDE library of all compilation information. The command will re-initialize the **names.dbe** and **samedl.dat** files and remove the remaining contents of the **samedl.lib** subdirectory.

sde.creatlib

sde.creatlib is used to create and initialize a new SDE library. It creates a directory named **samedl.lib** in the library directory, and creates the files **samedl.dat** and **names.dbe** in the **samedl.lib** directory.

sde.ls

sde.ls provides you with a list of the SAMeDL modules compiled in an SDE library. Useful is the **interface** option which will provide information concerning the interface files generated for a module.

sde.mkscript

sde.mkscript will create a template for performing the Ada compilation of the generated Ada interface files (and the units they depend on) for the definitional or abstract modules.

sde.purge

sde.purge will remove all out of date/unused files from an SDE library. These files include temporary files (e.g., those used during compilation) or interface files that have been put out of date due to recompilation of the associated SAMeDL modules. In addition, **sde.purge** will also remove the library state information backup file **samedl.dat.back.**

sde.rm

sde.rm allows you to remove all information and related interface files associated with modules compiled in the SDE library.

sde.rmlib

You use **sde.rmlib** to remove an SDE library and all of the information it contains.

Chapter 3 SDE Library File System

This chapter contains an overview of SDE libraries and the files that comprise them.

3.1 Overview Of SDE Libraries

An SDE library is a host file system directory which acts as a central database of SAMeDL compilation information and related generated interfaces.

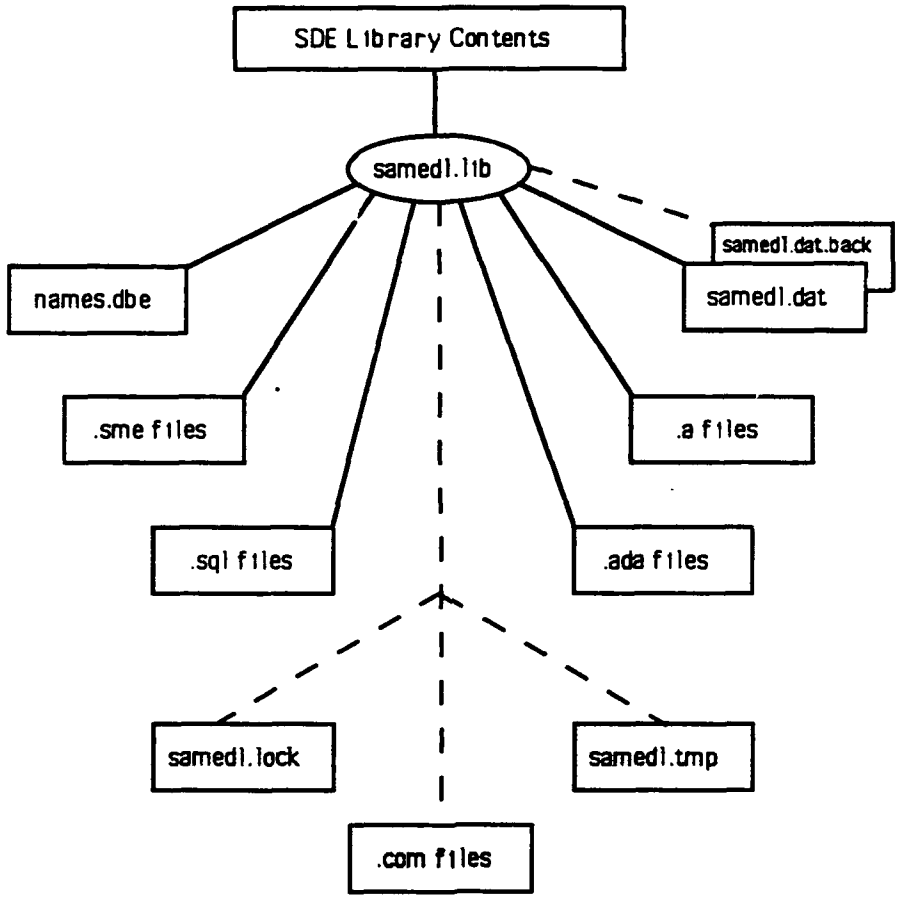

Figure 3.1: Contents of an SDE Library

Every directory representing an SDE library will contain the directory **samedl.lib**. **samedl.lib** in turn contains the files **names.dbe, samedl.dat,** and **samedl.dat.back**, and various files ending with **.sme**, **.sql**, **.ada**, and **.a** extensions. In addition, there are a variety of temporary files that may appear under **samedl.lib**: **samedl.lock**, **samedl.tmp**, and files ending with the extension **.com**.

Note: in general, it is not advisable for you to modify or place any files in the directory **samedl.lib** that are not otherwise generated by SDE. In particular, **sde.rmlib** and **sde.cleanlib** do the equivalent of a UNIX "**rm -r samedl.lib**" as part of their operation.

3.2 Core Library Files

When you initially create a new SDE library (via **sde.creatlib**) or "clean" an existing SDE library (via **sde.cleanlib**), the directory **samedl.lib** will only contain the following core library files: **samedl.dat** and **names.dbe**. In certain circumstances, a backup file for **samedl.dat** named **samedl.dat.back** will also be present.

samedl.dat

samedl.dat is the net disk data file for the library. It contains a series of records, each record containing the data for a single node in the internal representation of the dependency tree. The information in the file is in text format, that can be read/written by the SDE module manager and the SAMeDL compiler.

The internal representation of the dependency information is tree-like. Each node in the tree represents a file in the SAMeDL system, and has information about all nodes that are dependent on it and nodes that it depends on (called *CaredAboutBy* and *CaresAbout* arcs respectively). Each node also contains the time it was created, the external source file it was created from, the name of the source file saved in the library and the name of the library file that the generated code resides in.

Nodes are given node numbers that uniquely identify them. This practice facilitates saving the tree to the designated disk file and reading it back because pointers do not need to be included in the disk file. It also facilitates the use of uniform data structures for the internal representation because variable length records do not need to be used. Instead, lists are maintained off each node that contain the node numbers of the nodes that the node depends upon, or is depended upon by.

The records in the disk data have the following fields:

Node Number	number of the node that specifies the unit
Node Type	the type of file this node points to
Unit Name	name of the compiled unit
Time Entered	time the unit was entered into the library
Library File	name of file saved in library
External File	pathname of file that the node was generated from
Cares About Arc Num	number of cares about arcs from this node
Cares About Arc List	list of cares about arcs from this node
Cared About By Arc Num	number of care about arcs to this node
Cared About By Arc List	list of care about arcs to this node

The records in the disk data file are written out in text form, one after the other with a special character separating each node.

samedl.dat.back

The **samedl.dat.back** file is a backup copy of the **samedl.dat** file that the SAMeDL compiler and the **sde.rm** command make before they change the **samedl.dat** file. **samedl.dat.back** will contain the prior library state information and thus will allow you to undo the effects of the last **samedl** or **sde.rm** command (provided that a **sde.purge** command has not been since executed; see below). In order to restore the library back to its prior state, you should go to the **samedl.lib** directory corresponding to your SDE library, remove the existing **samedl.dat** file, and rename (using the UNIX **mv** command for example) **samedl.dat.back** to **samedl.dat**. Note that because of the semantics of the **sde.purge** command, an SDE library may not be restored if the library has been purged.

names.dbe

The **names.dbe** file is a text file that maintains two integer counters used internally by the compiler to keep track of procedures and variables across separate compilations.

3.3 Modules and Interface Files

When a SAMeDL module is compiled into an SDE library, depending on the type of module, the compiler will generate a series of files in the **samedl.lib** directory. These are as follows:

Module Type	File Name	Description
Definitional Module	D_xxxxx.sme	Text file containing SAMeDL source code representing the definitional module
	P_xxxxx_.a	Generated Ada package specification file
	B_xxxxx.a	Generated Ada package body file
Schema Module	S_xxxxx.sme	Text file containing SAMeDL source code representing the schema module
Abstract Module	A_xxxxx.sme	Text file containing SAMeDL source code representing the abstract module
	P_xxxxx_.a	Generated Ada package specification file
	B_xxxxx.a	Generated Ada package body file
	E_xxxxx.sql	Generated Ada SQL Module file
	E_xxxxx.ada	Ada code for the expanded/compiled Ada SQL Module file

where **xxxxx** denotes a unique integer.

3.4 Miscellaneous Temporary Files

Occasionally during the normal operation of running the SAMeDL compiler and the Module Manager utility tools, temporary files may be generated in the **samedl.lib** directory. A brief explanation of these files follow.

samedl.lock

This file is present if someone is currently operating in the SDE library and therefore has it *locked*. If you attempt to operate within the library and it is already locked, you will be notified by an appropriate informative message and the operation will be terminated.

Occasionally you will be notified that the library is locked even though, in reality, nobody is currently using the library. This would typically occur if you abnormally terminate the compiler or an SDE command causing the lock file to not be correctly removed (and thereby preventing

yourself and others from using the library). If you are sure this is the case, you can correct the problem easily by removing **samedl.lock** from the library's **samedl.lib** directory.

samedl.tmp

This file is a temporary text file used by the compiler during the update of an SDE library.

.com Files

Files whose names take the form **xyz.com** are UNIX command (or *script*) files written in the UNIX C-shell (**csh**) language. This command file is generated and used by the SAMeDL compiler to (transparently) precompile the **.ec** files and C compile the **.c** files associated with every abstract module in the SAMeDL input source file **xyz.sme**.

3.5 Standard SAMeDL Modules and Ada Support Packages

As documented in **[LRM]** Appendices A, B, and C, there are a number of standard SAMeDL modules and Ada support packages defined as part of SAMeDL. These include the following:

- The SAMeDL modules **SAMeDL_Standard** and **SAMeDL_System**
- The Ada packages **SQL_Database_Error_Pkg, SQL_Boolean_Pkg, SQL_Int_Pkg, SQL_Smallint_Pkg, SQL_Real_Pkg, SQL_Char_Pkg,** and **SQL_Enumeration_Pkg.**

Note: The packages SQL_Standard and SQL_Double_Precision described in [LRM] are not provided with the XDB-targeted compiler because XDB provides its own SQL_Standard (which SAMeDL-generated code will use) and XDB does not support a double precision type through its SQL-Ada Module Compiler.

The standard SAMeDL modules contain predefined elements such as predefined base domain declarations and database specific constants. These modules may be used in SAMeDL code you develop just as you would any other SAMeDL module by bringing them into context through the use of context clauses . Note however that before you can use these modules, they must have been previously compiled by the SAMeDL compiler into your SAMeDL library. This is discussed further in Section 5.2 of this document.

Because the interfaces generated by the SAMeDL compiler depend on the standard Ada support packages, you must compile the standard packages into an Ada development library that can be used by your interfaces and application programs. For further information on how to accomplish this, please refer to Section 5.3.

Chapter 4 Getting Started With SDE

This chapter presents some basic scenarios for using the SAMeDL Development Environment: creating an SDE library, compiling a SAMeDL source file, and creating an Ada application program which uses the SAMeDL compiler generated modules to interface with the database environment. The scenarios have intentionally been kept simple; details are deferred to later sections of this manual.

Suppose you want to design an Ada application program which interacts with a database environment. The basic steps are:

1. Create the XDB Database that the application will access, if it does not already exist.
2. Create an SDE library for the database.
3. Prepare a SAMeDL source input file and compile it into the SDE library.
4. Write the Ada application program which uses the SAMeDL standard packages and the Ada definition/abstract modules generated by the SAMeDL compiler.
5. Compile and link the Ada application program.

4.1 Creating A Database

The initial creation and maintenance of a XDB database is beyond the scope of SAMeDL. As described in the XDB system administration manual **[XDB],** the Database Administrator will create and maintain databases through the use of XDB DBMS commands. Typical tasks would include:

- Create a Database
- Create the Database files(tables) and fields(columns) for the Database.
- Assign the appropriate permissions to the Database and set the necessary environment variables to allow application connection through the XDB Ada application programming interface.
- Turn on database logging capabilities if desired.

4.2 Creating An SDE Library

Once an appropriate database exists, you need to create an SDE library before you can compile SAMeDL source code. The SDE library will be used by the SAMeDL compiler to store information necessary for separate compilation and also to act as a repository for the interface files that are generated.

You create a new SDE library with the **sde.creatlib** command. This command optionally takes one argument which is the directory name for the library; if you do not specify an argument, then the library will be generated in your current working directory.

For example, to create an SDE library in the directory **/usr/same/example/samelib**, you would issue the following command:

```
%sde.creatlib /usr/same/example/samelib
```

In order to create the library, it is important that you have have appropriate read/write privileges for the library directory.

4.3 Compiling A SAMeDL Source File

The next step is to prepare a SAMeDL source file (with the text editor of your choice) and compile it into the SDE Library.

Before you can use the compiler however, you must properly set the environment variable **XDBPATH** to contain the path name to the XDB RDBMS installation directory (e.g., **/usr/XDB**).

Consider the following description which is assumed to be in the file **bank.sme**. This example contains three modules: the definition module **samplemod**, the schema module **recdb**, and the abstract module **recdml**. Furthermore, the example depends on the definition module **samedl_standard** which must have been previously compiled into your SAMeDL library.

```
--!reference samedl_standard
with samedl_standard; use samedl_standard;
definition module SampleMod is

    -- Member Information
    domain Member_Name is new SQL_CHAR Not Null (LENGTH => 30);
    domain SSN is new SQL_CHAR Not Null (LENGTH => 9);
    domain Age is new SQL_SMALLINT ( FIRST => 1, LAST => 199.0);

    enumeration SexEnum is (F, M);
    domain Sex is new SQL_ENUMERATION_AS_CHAR (
                        ENUMERATION => SexEnum,
                        WIDTH => 1,
                        MAP =>(m=>'B', f=>'A'));

    domain Phone is new SQL_CHAR (LENGTH => 8);
    domain Street is new SQL_CHAR (LENGTH => 30);
    domain City is new SQL_CHAR (LENGTH => 15);

    domain County is new SQL_CHAR Not Null (LENGTH => 2);

    domain Club_Number is new SQL_SMALLINT Not Null;

    exception Record_Not_Found;

    enumeration FailType is (Not_Logged_In, SQL_Ok, SQL_Fail);

    status fetch_map named is_found uses Failtype is
        ( -999 .. -300 => SQL_Fail,
            -299, -298 => Not_Logged_In,
                     0 => SQL_Ok,
                   100 => raise samplemod.record_not_found);

end SampleMod;
```

```
with SampleMod; use SampleMod;
schema module RecDB is

    table Members is
        MemberName not null : Member_Name,
        MemberSSN not null : SSN,
        ClubNumber not null : Club_Number,
        MemberAge     : Age,
        MemberSex     : Sex,
        MemberPhone   : Phone,
        MemberStreet  : Street,
        MemberCity    : City,
        MemberCnty not null : County
    end Members;

end RecDB;


with SampleMod; use SampleMod;
extended abstract module RecDML is
   authorization RecDB

    record MemberRec is
        MemberName    : Member_Name;
        MemberSSN     : SSN;
        ClubNumber    : Club_Number;
        MemberAge     : Age;
        MemberSex     : Sex;
        MemberPhone   : Phone;
        MemberStreet  : Street;
        MemberCity    : City;
        MemberCnty    : County;
    end;

    procedure CommitWork is
        commit work;

    extended procedure connectRecdb is
        connect;

    procedure MemberInsert is
        insert into RecDB.Members
        from Row : MemberRec VALUES;

    cursor MemberSelect (Req_MemberSSN : SSN) for
        select MemberName,
               MemberSSN,
               ClubNumber,
               MemberAge,
               MemberSex,
               MemberPhone,
               MemberStreet,
               MemberCity,
               MemberCnty
        from RecDB.Members
        where RecDB.Members.MemberSSN = Req_MemberSSN;
    is
```

```
        procedure FetchIt is
            fetch into Row : MemberRec
          status Fetch_Map named Rec_Status;

      end MemberSelect;

end RecDML;
```

The SAMeDL compiler is invoked with the command **samedl.** For example, to compile **bank.sme** into the SDE library created above, you should issue the following command:

```
%samedl -library /usr/same/example/samelib bank.sme
```

The **-library** qualifier is used to specify the name of an existing SDE library; this is optional, and if not given, the library will be assumed to exist in your current working directory. You must give the host filename of the SAMeDL input source file; this filename must end with the characters **.sme**. For more information on invoking the SAMeDL compiler, refer to Chapter 5 of this manual.

The SAMeDL compiler will generate interface files for each definition module (an Ada package specification/body pair) and each abstract module (an Ada package specification/body pair, an Ada-SQL Module file, and an ada code file derived from the Ada-SQL Module). No interface files are generated for schema modules. All interface files will be placed in the samedl.lib directory contained within the library directory. Thus, for the sample compiler invocation above, you can find all interface files in the directory **/usr/same/example/samelib/samedl.lib**.

To determine what the names of the generated interface files for the modules **samplemod** and **recdb**, you can use the **sde.ls** command. For example:

```
%sde.ls -l /usr/same/example/samelib -i samplemod recdml

samplemod
   Interface Files:
      /usr/same/example/samelib/samedl.lib/P_2_.a (ADASPEC)
      /usr/same/example/samelib/samedl.lib/B_2.a (ADABODY)

recdml
   Interface Files:
      /usr/same/example/samelib/samedl.lib/P_3_.a (ADASPEC)
      /usr/same/example/samelib/samedl.lib/B_3.a (ADABODY)
      /usr/same/example/samelib/samedl.lib/E_1.sql (SQLMODULE)
      /usr/same/example/samelib/samedl.lib/E_1.ada (GENED_ADA)
```

For more information concerning the naming conventions used for SDE library files, see Section 3.3 of this document.

4.4 Creating An Ada Application Program

The Ada files produced by the SAMeDL compiler along with the SAMeDL standard packages provide an abstract Ada interface to the database which may be utilized by an Ada application program. So before you can build your application, you first need to compile these files into an appropriate Ada library that will be visible to your Ada application development library.

The SAMeDL standard packages are provided as part of SDE. To determine the location of these files at your site, please refer to the SDE installation notes or ask your system administrator.

To generate an "invoke" command file for compiling the Ada interface files contained in your SAMeDL library into your Ada library, you may use the **sde.mkscript** command. For example:

```
%sde.mkscript -l /usr/same/example/samelib -o my_script samplemod recdml
%more my_script
Compile (Source => "/usr/same/example/samelib/samedl.lib/P_1_.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/B_1.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/P_2_.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/B_2.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/P_3_.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/E_1.ada");
Compile (Source => "/usr/same/example/samelib/samedl.lib/B_3.a");
```

In this example, the **sde.mkscript** command indicates that 3 sets of Ada package spec/body pairs plus another Ada package spec/body pair (the ".ada" file) need to be compiled, even though the initial compilation of the file containing **samplemod** and **recdml** generated only 2 Ada packages spec/body pairs. The reason for this discrepancy is that the definitional module **samplemod** references the previously-compiled module **samedl_standard**, which contains the definitions of the base domains SQL_CHAR, SQL_INT, etc. The reference to **samedl_standard** is achieved via a **reference directive**. For more information on compiler directives, see Section 5.4 of this manual. The additional Ada file ending with the ".ada" extension contains the Ada code for the expanded/compiled Ada SQL Module file (see Section 3.3 of this manual).

Using the bank example presented above, suppose that you need a utility that will allow bank tellers access to profile information for a customer. You could accomplish this with the following Ada program:

```
with TEXT_IO;
use  TEXT_IO;
with SAMPLEMOD;
with RECDML;
procedure MAIN is

-- User I/O information
    IN_BUFFER : STRING(1 .. 80);
    LAST      : NATURAL;
    OPT       : INTEGER;

    -- Members Row Record
    ROW       : RECDML.MEMBERREC;
    IROW      : RECDML.MEMBERREC;

    procedure DO_INSERT is
    begin
        PUT_LINE("*** Function to Insert rows ***");
        NEW_LINE;
        loop
            IN_BUFFER := (others => ' ');
            PUT("Enter Member SSN (9 char max) or -1 for MENU> ");
            GET_LINE(IN_BUFFER, LAST);
            NEW_LINE;
            exit when (IN_BUFFER(1 .. LAST) = "-1");
```

```
IROW.MEMBERSSN := SAMPLEMOD.SSN_NOT_NULL(IN_BUFFER(1 .. 9));

IN_BUFFER := (others => ' ');
PUT("Enter Member Name (30 char max)> ");
GET_LINE(IN_BUFFER, LAST);
NEW_LINE;
IROW.MEMBERNAME :=
  SAMPLEMOD.MEMBER_NAME_NOT_NULL(IN_BUFFER(1 .. 30));

IN_BUFFER := (others => ' ');
PUT("Enter Club Number (Smallint)> ");
GET_LINE(IN_BUFFER, LAST);
NEW_LINE;
IROW.CLUBNUMBER :=
  SAMPLEMOD.CLUB_NUMBER_NOT_NULL'VALUE(
    IN_BUFFER(1 .. LAST));

IN_BUFFER := (others => ' ');
PUT("Enter Member Age (Smallint) or \\ for NULL> ");
GET_LINE(IN_BUFFER, LAST);
NEW_LINE;
if (IN_BUFFER(1 .. 2) = "\\") then
    SAMPLEMOD.AGE_OPS.ASSIGN(IROW.MEMBERAGE,
      SAMPLEMOD.NULL_SQL_SMALLINT);
else
    SAMPLEMOD.AGE_OPS.ASSIGN(IROW.MEMBERAGE,
      SAMPLEMOD.AGE_OPS.WITH_NULL(
        SAMPLEMOD.AGE_NOT_NULL'VALUE(
          IN_BUFFER(1 .. LAST))));
end if;

IN_BUFFER := (others => ' ');
PUT("Enter Member Sex (M/F) or \\ for NULL> ");
GET_LINE(IN_BUFFER, LAST);
NEW_LINE;
if (IN_BUFFER(1 .. 2) = "\\") then
    SAMPLEMOD.ASSIGN(IROW.MEMBERSEX,
      SAMPLEMOD.NULL_SQL_ENUMERATION);
else
    SAMPLEMOD.ASSIGN(IROW.MEMBERSEX,
      SAMPLEMOD.WITH_NULL(
        SAMPLEMOD.SEX_NOT_NULL'VALUE(
          IN_BUFFER(1 .. LAST))));
end if;

IN_BUFFER := (others => ' ');
PUT("Enter Member Phone (8 chars) or \\ for NULL> ");
GET_LINE(IN_BUFFER, LAST);
NEW_LINE;
if (IN_BUFFER(1 .. 2) = "\\") then
    SAMPLEMOD.ASSIGN(IROW.MEMBERPHONE,
      SAMPLEMOD.NULL_SQL_CHAR);
else
    SAMPLEMOD.ASSIGN(IROW.MEMBERPHONE,
      SAMPLEMOD.PHONE_OPS.WITH_NULL(
        SAMPLEMOD.PHONE_NOT_NULL(IN_BUFFER(1 .. 8))));
end if;
```

```
            IN_BUFFER := (others => ' ');
            PUT("Enter Member Street (30 char max) or \\ for NULL> ");
            GET_LINE(IN_BUFFER, LAST);
            NEW_LINE;
            if (IN_BUFFER(1 .. 2) = "\\") then
                SAMPLEMOD.ASSIGN(IROW.MEMBERSTREET,
                  SAMPLEMOD.NULL_SQL_CHAR);
            else
                SAMPLEMOD.ASSIGN(IROW.MEMBERSTREET,
                  SAMPLEMOD.STREET_OPS.WITH_NULL(
                    SAMPLEMOD.STREET_NOT_NULL(IN_BUFFER(1 .. 30))));
            end if;

            IN_BUFFER := (others => ' ');
            PUT("Enter Member City (15 char max) or \\ for NULL> ");
            GET_LINE(IN_BUFFER, LAST);
            NEW_LINE;
            if (IN_BUFFER(1 .. 2) = "\\") then
                SAMPLEMOD.ASSIGN(IROW.MEMBERCITY,
                  SAMPLEMOD.NULL_SQL_CHAR);
            else
                SAMPLEMOD.ASSIGN(IROW.MEMBERCITY,
                  SAMPLEMOD.CITY_OPS.WITH_NULL(
                    SAMPLEMOD.CITY_NOT_NULL(IN_BUFFER(1 .. 15))));
            end if;

            IN_BUFFER := (others => ' ');
            PUT("Enter Member Cnty (2 char max)> ");
            GET_LINE(IN_BUFFER, LAST);
            NEW_LINE;
            IROW.MEMBERCNTY :=
              SAMPLEMOD.COUNTY_NOT_NULL(IN_BUFFER(1 .. 2));

            RECDML.MEMBERINSERT(IROW);
            RECDML.COMMITWORK;
        end loop;

    exception
        when others =>
            PUT_LINE("*** Error: could not do Insert ***");
    end DO_INSERT;

    procedure DO_SELECT is
        STATUS : SAMPLEMOD.FAILTYPE;
    begin
        PUT_LINE("*** Function to Select rows ***");
        NEW_LINE;
        loop
            IN_BUFFER := (others => ' ');
            PUT("Enter Member SSN (9) or -1 for MENU> ");
            GET_LINE(IN_BUFFER, LAST);
            NEW_LINE;
            exit when (IN_BUFFER(1 .. LAST) = "-1");
            RECDML.MEMBERSELECT.OPEN(SAMPLEMOD.SSN_NOT_NULL(
              IN_BUFFER(1 .. 9)));

            begin
                loop
```

```
        RECDML.MEMBERSELECT.FETCHIT(ROW, STATUS);

        PUT_LINE("NAME: " & STRING(ROW.MEMBERNAME) & "     "&
                 "SSN:  " & STRING(ROW.MEMBERSSN) & "     " &
                 "CLUB: " &
                 SAMPLEMOD.CLUB_NUMBER_NOT_NULL'IMAGE(
                   ROW.CLUBNUMBER));

        PUT("AGE: ");
        if not (SAMPLEMOD.IS_NULL(ROW.MEMBERAGE)) then
            PUT(SAMPLEMOD.AGE_NOT_NULL'IMAGE(
              SAMPLEMOD.AGE_OPS.WITHOUT_NULL(
                ROW.MEMBERAGE)));
        end if;
        SET_COL(13);

        PUT("SEX: ");
        if not (SAMPLEMOD.IS_NULL(ROW.MEMBERSEX)) then
            PUT(SAMPLEMOD.SEX_NOT_NULL'IMAGE(
              SAMPLEMOD.WITHOUT_NULL(ROW.MEMBERSEX)));
        end if;
        NEW_LINE;

        PUT("PHONE: ");
        if not (SAMPLEMOD.IS_NULL(ROW.MEMBERPHONE)) then
            PUT(STRING(SAMPLEMOD.PHONE_OPS.WITHOUT_NULL(
              ROW.MEMBERPHONE)));
        end if;
        NEW_LINE;

        PUT("STREET: ");
        if not (SAMPLEMOD.IS_NULL(ROW.MEMBERSTREET)) then
            PUT(STRING(SAMPLEMOD.STREET_OPS.WITHOUT_NULL(
              ROW.MEMBERSTREET)));
        end if;
        NEW_LINE;

        PUT("CITY: ");
        if not (SAMPLEMOD.IS_NULL(ROW.MEMBERCITY)) then
            PUT(STRING(SAMPLEMOD.CITY_OPS.WITHOUT_NULL(
              ROW.MEMBERCITY)));
        end if;
        SET_COL(26);

        PUT_LINE("COUNTY: " & STRING(ROW.MEMBERCNTY));
        NEW_LINE;
        PUT_LINE("**********************************");
        NEW_LINE;
    end loop;
```

```
                exception
                    when others =>
                        PUT_LINE("No more records found!");
                        NEW_LINE;
                end;

                RECDML.MEMBERSELECT.CLOSE;
                RECDML.COMMITWORK;

            end loop;

        exception
            when others =>     -- Couldn't find request
                PUT_LINE("*** Error: could not do Select ***");

        end DO_SELECT;

    begin
        RECDML.CONNECTRECDB;
        loop
            PUT_LINE("*** Option Menu ***");
            PUT_LINE("    0 - Quit");
            PUT_LINE("    1 - Insert");
            PUT_LINE("    2 - Select");
            PUT("Option? > ");
            GET_LINE(IN_BUFFER, LAST);
            NEW_LINE;
            OPT := INTEGER'VALUE(IN_BUFFER(1 .. LAST));

            case OPT is
                when 0 =>
                    exit;
                when 1 =>
                    DO_INSERT;
                when 2 =>
                    DO_SELECT;
                when others =>
                    PUT_LINE("Illegal Choice: " & IN_BUFFER(1 .. LAST));
            end case;
            NEW_LINE(2);
        end loop;
    end MAIN;
```

Assuming that your Alsys Ada development library is in **/usr/same/example/adalib** and that the above Ada program is in the file **getprof.a**, you can compil and link the program by performing the following steps, which use the file **myscript**:

- Compile the SAMeDL Standard Packages into your Ada library (this step may be omitted if visibility to the SAMeDL Standard Packages has been gained in another way).

```
%$SDEPATH/comp_std_pkgs /usr/same/example/adalib
```

- Compile the code generated by the SAMeDL compiler into your library, using the script generated by the **sde.mkscript** command.

```
%ada
> default.compile(library=>/usr/same/example/adalib)
> invoke (file=>myscript)
> quit
```

- Compile your application into the Ada library.

```
%ada
> default.compile(library=>/usr/same/example/adalib)
> compile (source=>getprof.ada)
> quit
```

- Generate the executable using the Alsys BIND command. When issuing the BIND command, include the following arguments in addition to providing values for the required PROGRAM and LIBRARY parameters **[AdaRef]**:

  (a) MODULES => **$XDBPATH/ada/adaload.o**

  (b) SEARCH => **/usr/lib/libcurses.a**

- The order of arguments for the MODULES parameter is not significant, but the order of arguments for the SEARCH parameter is significant. If your application program requires additional external modules, you may have to reorder the list of external modules before all references can be adequately resolved. Consult the Alsys Ada User's Manual for further information.

In the example above, the Unix C-shell (csh) script **comp_std_pkgs** provided with SDE contains Alsys Ada Compiler commands and is described in Section 5.3 of this document (**SDEPATH** is an environment variable which has been set to the path name for the SDE installation directory).

Chapter 5 Building Ada/SQL Interfaces With SAMeDL

5.1 Overview Of The SAMeDL Compiler

The SAMeDL compiler is used to generate interface files representing an Ada/SQL interface for your Ada applications. These interface files consist of one or more files containing Ada packages representing the Ada interface:

- Each definition module defined in the source input will have an Ada package specification and a corresponding Ada package body generated.
- Each abstract module defined in the source input will have an Ada package specification and a corresponding Ada package body generated.

In addition, for each abstract module a corresponding *concrete* module will be generated. This file takes the form of an XDB Ada-SQL Module. Procedures declared within the file are called by procedures within the abstract module's Ada package body in order that direct interaction with the database can be handled. Each such file will be preprocessed by the XDB Ada SQL Module Compiler (**sqlmc**) and the generated output will be an Ada file containing an Ada specification/body pair that completes the Ada-XDB interface for your application.

The SAMeDL compiler operates within the context of an SDE library. The library maintains dependency information and other data used by the compiler to perform separate compilation. In addition, the SDE library acts as a repository for all interface files generated by the SAMeDL compiler.

5.2 SAMeDL Compiler Invocation

The SAMeDL compiler is invoked with the command **samedl**. It accepts a series of options and a single file name as input arguments. Option keywords are not case sensitive and may be truncated as long as the resulting abbreviation is unambiguous.

Syntax

samedl [*options*] *source_file*

Options

-library *pathname*	Operate in the SDE library *pathname*. If not specified, will default to current working directory
-list	Generate an interleaved listing file
-syntax	Check the syntax of the input file without generating any output files.

samedl executes the SAMeDL compiler and compiles the named SAMeDL source file into the SDE library directory specified by *pathname*; if *pathname* is not specified, then it will default to

the current working directory. Note that the SDE library must already have been created (via the **sde.creatlib** command). The SAMeDL source file name must end with the suffix **.sme**.

The listing option, when specified, directs the compiler to produce an interleaved listing file. The listing file will be named **<x>.lis** where <x> is the base name of the input source file (for example, a source file named **xyz.sme** will result in a listing file being named **xyz.lis**). Compiler diagnostic messages will always be written to standard output, regardless of whether or not **-list** is in effect.

The syntax option, when specified, causes the SAMeDL compiler to act as a SAMeDL syntax checker, generating error messages for syntax and some semantic errors, but no code.

The SAMeDL compiler will generate interface files for each definition module (an Ada package specification/body pair) and each abstract module (an Ada package specification/body pair, an Ada SQL Module file, and an Ada package specification/body pair generated from the Ada SQL Module). No interface files are generated for schema modules. All interface files will be placed in the **samedl.lib** directory contained within the library directory. For the naming conventions used for interface files, please refer to Section 3.3 in this manual.

As an example, take the following:

```
%samedl -lib /usr/same/example/samelib -list example.sme
```

This will compile the SAMeDL description file **example.sme** into the library **/usr/same/example/samelib** and create an interleaved listing file named **example.lis** in the current directory. All generated interface files will be placed in the directory **/usr/same/example/samelib/samedl.lib**.

Before invoking the SAMeDL Compiler, users should be sure to check that SAMeDL packages required via reference directives have already been compiled into the SAMeDL library. In particular, a typical SAMeDL code file will include reference directives for the SAMeDL definitional modules **SAMeDL_Standard** and **SAMeDL_System**, found in the files **$SDEPATH/STD_PKGS/samedl_std.sme** and **$SDEPATH/STD_PKGS/samedl_sys.sme**. These packages contain definitions for system limits and predefined base domains. Users who tend to frequently use the predefined base domains should get into the habit of compiling these files into their SAMeDL libraries at library creation time.

Before you can use the compiler however, you must properly set the environment variable **XDBPATH** to contain the path name to the XDB RDBMS installation directory (e.g., **/usr/XDB**).

5.3 Using the Compiler-Generated Interface

In order to use the SAMeDL compiler generated Ada/SQL interface, the target Ada application must be linked with the SAMeDL generated Ada files, a set of SAMeDL standard packages (see Section 3.5), an XDB object code file, and the Unix Curses Library. In addition, the Alsys Ada library **$XDBPATH/ada/xdbaapi,** created during XDB installation should be made visible to the Alsys Ada library that you intend to use for your Ada-XDB application (you can do this by making **$XDBPATH/ada/xdbaapi** the parent of your Alsys library when you create it).To facilitate the final steps in building the Ada target application, SDE provides you with a Unix C-shell script that contains Alsys Ada Compiler commands. This script can be found in the SDE

installation directory and used as an example of how to compile the SAMeDL Standard Packages your application requires using the Alsys Ada Compiler. It is called **comp_std_pkgs**.

The first step in compiling and linking your application is to make the SAMeDL standard packages visible to your Alsys Ada application library. This can be done by using the **comp_std_pkgs** script file found in the SDE installation directory. You may invoke the **comp_std_pkgs** by issuing the following command:

```
%comp_std_pkgs libpath
```

where **libpath** is the pathname to the Ada library that the SAMeDL standard packages are to be compiled into. This script will compile all of the SAMeDL standard packages into your Ada library. This step needs to be performed once per library, unless the SAMeDL standard packages have already been made visible to the Ada library in some other way.

Once the standard packages have been compiled into the Ada library, the SAMeDL-generated Ada packages should be compiled into the library. The SDE command **sde.mkscript** can be used to generate a script file for performing this compilation. Refer to section 8.6 of this document for instructions and examples.

After the SAMeDL interface code has been compiled into your library, you may use the Alsys **Compile** command to compile your application into the library. Once this step has been completed, you are ready to prepare for linking the Ada-XDB executable.

There are 2 files which must be linked with your application in order to produce a valid executable. One of the files, namely **$XDBPATH/ada/adaload.o** is an XDB object file. The other file is the Interactive Unix Curses library.

Your Ada application can be linked easily by following these simple instructions:

- Generate the executable using the Alsys BIND command. When issuing the BIND command, include the following arguments in addition to providing values for the required PROGRAM and LIBRARY parameters **[AdaRef]**:

  (a) MODULES => **$XDBPATH/ada/adaload.o**

  (b) SEARCH => **/usr/lib/libcurses.a**

- The order of arguments for the MODULES parameter is not significant, but the order of arguments for the SEARCH parameter is significant. If your application program requires additional external modules, you may have to reorder the list of external modules before all references can be adequately resolved. Consult the Alsys Ada User's Manual for further information.

5.4 Compiler Directives

Compiler directives are embedded in SAMeDL source files and are used to indicate special directions to the compiler outside of the SAMeDL syntax and semantics. The general form of any directive is:

```
--!directive_name  parameter_list
```

In order for a directive to be recognized, it is important that no *white space* (i.e., spaces, tabs, etc.) appear between any of the *dashes* (-), the *bang* (!), and the *directive_name* keyword.

Each directive will be given in its general form, followed by a definition of each term of the directive, and a description of its use.

5.4.1 Reference Directive

The reference directive allows you flexibility of separate compilation by permitting visibility of externally declared modules that have been previously compiled. This directive(s) must appear immediately before the first context clause of a SAMeDL module.

The compiler processes the reference directive by reading the referenced module from the SDE library currently in context and importing the appropriate symbol information for the referenced module. Once a reference directive is used for a particular module, then any module appearing textually after the reference directive may refer to the contents of the referenced module.

Typical use for the reference directive is to gain visibility to the SAMeDL packages SAMeDL_Standard and SAMeDL_System, which contain the definitional modules for the predefined base domains and the system limits.

The form of the reference directive is as follows:

```
--!reference module_name
```

The **reference** keyword must begin immediately following the ! and the entire word must be included. The keyword is case-insensitive. module_name must reference the name of a SAMeDL module that has been previously compiled into the SDE library.

Note: This directive must be placed before the context clauses of a module declaration; placing it between the start of a module declaration and the corresponding END will cause a fatal error. Also, this directive will not compile the referenced module. Any module that needs to be compiled or re-compiled, needs to be done so separately.

As an example, assume the following definitional and schema modules have been previously compiled.

```
DEFINITION MODULE Bank_Def IS
   DOMAIN Customer_name_domain IS NEW SQL_CHAR(length => 50);

      .
      .
      .

END Bank_Def;

WITH Bank_Def;
USE Bank_Def;
SCHEMA MODULE BankDB IS

      .
      .
```

```
END BankDB;
```

Then the following Abstract module would have full visibility to both modules using the reference directive:

```
--!Reference bank_def
--!Reference bankdb
WITH Bank_Def;
USE Bank_Def;
ABSTRACT MODULE Bank_Actions IS
   AUTHORIZATION BankDB

      .
      .
      .

END Bank_actions;
```

Chapter 6 Implementation Dependent Features

This chapter describes SAMeDL features which are dependent on the XDB implementation. Section 6.1 describes features which are included as part of the SAMeDL language ([LRM]) but not supported due to limitations imposed by XDB. Section 6.2 details features which are not included as part of the SAMeDL but are provided as extensions for the implementation either because of necessity or convenience. Finally, Section 6.3 includes some solutions to system errors that are commonly encountered.

6.1 SAMeDL Language Limitations Under XDB

Because of limitations imposed by XDB, use of the following features described in the SAMeDL Language Reference Manual ([LRM]) will produce errors (all references below are made with respect to [LRM]):

1. **Unused Procedure Parameters** - the SAMeDL language, in accordance with Ada, does not require that all declared procedure parameters be used in the procedure body. The XDB Ada SQL Module Compiler will issue an error if a parameter is declared but not used.

3. **Value Expressions** - The SAMeDL language, in accordance with the ANSI SQL Standard, allows input references to be part of value expressions, regardless of whether or not the input reference is to a null-bearing parameter. However, XDB does not allow null-bearing input references to be part of value expressions in select lists, where clauses or cursors. The SAMeDL compiler will issue an error if a null-bearing parameter is used in a place where XDB does not allow it.

6.2 SAMeDL Extensions For XDB

This section details features which are included as part of SAMeDL as implementation-specific extensions either because of necessity or convenience. They include the following statements:

Connect Statement

The connect_statement is an extended statement. It's grammar consists of the following productions:

```
connect_statement ::= connect ;
```

The Connect Statement connects the application to the XDB RDBMS. The specific database that the application will access can be specified in a variety of ways through use of the XDB RDBMS tools. To find out how to set the database path for your Ada-XDB application, consult your XDB documentation regarding the **xdbpath** and **profile** commands or consult your database administrator. No SAMeDL-generated application interface can access XDB data without successful connection to an XDB database.

Because the Connect statement is an extended statement, its containing procedure and abstract module must be marked as extended.

Definitional Module Bodies

The SAMeDL Compiler generates a package body for each definitional module. This practice differs from the recommendation of the SAMeDL LRM, but is maintained in order to decrease code size and functional redundancy.

The package body for each definitional module is empty unless the definitional module contains a domain declaration of data class **enumeration** possessing a user-defined database mapping as a value for the predefined parameter **MAP**. For each declaration of this type, a function to perform conversion from the domain type to the underlying database type is provided. A function to convert from the database type to the domain type is also provided. Without these globally accessible functions, a large amount of code would have to be reproduced frequently in the Abstract Module's package body in order to perform data conversions.

These functions can be accessed by the SAMeDL application, but are primarily designed for use by the SAMeDL compiler back-end to generate package bodies for Abstract Modules.

6.3 Troubleshooting Common System Errors

The following list includes some helpful techniques for configuring the SAMeDL environment that will reduce your chances of getting.some common system errors.

1. **Increase the MAXUMEM Interactive Unix kernel parameter** - If you get an XDB error message when running your application that indicates that your application process does not have enough memory available to run successfully, then you should increase the MAXUMEM kernel parameter. Consult your Unix system administrator for instructions.

2. **Increase the Interactive Unix ULIMIT kernel parameter** - If you get an Alsys error message during the LISTING phase of compiling your application, then you might try raising the ULIMIT kernel parameter to increase the file size limit. Consult your Unix system administrator for instructions.

Chapter 7 Tool Limitations

This chapter lists limitations of SDE.

7.1 SAMeDL Compiler Limitations

The following limitations are imposed by the SAMeDL compiler:

- The maximum number of characters allowed in a source line is 255.
- The compiler will not delete any files from an SDE library; the **sde.purge** command must be used to clean the library of any out of date or temporary files.
- The maximum length of an Error Message that can be printed by the Process_Database_Error routine is 132 characters.
- If extremely long names are used in the SAMeDL source code, it is possible that the compiler could attempt to generate output with lines that exceed the Unix line length limit. The SAMeDL compiler will issue a warning if excessive name length results in an output problem.
- The value range for types Smallint and Indicator_Type is -32768 .. 32767.
- The value range for types Int and Sqlcode_Type is -2147483648 .. 2147483647.
- The value range for type Real is -1.0E300 .. 1.0E300.

In addition, because Ada source is generated by the SAMeDL compiler, all restrictions and semantics as outlined in **[Ada]** and **[AdaRef]** must be followed. Although these limits are not explicitly checked by the SAMeDL compiler, they do indirectly affect the structure of what normally would be legal SAMeDL code.

7.2 SDE Module Manager Limitations

The following limitations are imposed by the SDE Module Manager:

1. The SDE commands (with the exception of **sde.purge**) will not delete any files from an SDE library; the **sde.purge** command must be used to clean the library of any out of date or temporary files.
2. After executing the **sde.purge** command, you may not restore the library to its prior state.

Chapter 8 SDE Command Reference Manual Pages

This chapter contains a reference guide for each of the commands in SDE. The commands available to you are:

samedl	invoke the SAMeDL compiler
sde.cleanlib	reinitialize an SDE library
sde.creatlib	create an SDE library
sde.ls	list compiled SAMeDL modules
sde.mkscript	generate an Ada compilation script file for an interface file
sde.purge	remove out of date files from an SDE library
sde.rm	remove a SAMeDL module from an SDE library
sde.rmlib	remove an SDE library

8.1 samedl

Command

samedl - invoke the SAMeDL compiler

Syntax

samedl [*options*] *source_file*

Options

-library *pathname*	Operate in the SDE library *pathname*. If not specified, will default to current working directory
-list	Generate an interleaved listing file
-syntax	Check the syntax of the input file without generating any output files.

Description

samedl executes the SAMeDL compiler and compiles the named SAMeDL source file into the SDE library directory specified by *pathname*; if *pathname* is not specified, then it will default to the current working directory. The SAMeDL source file name must end with the suffix **.sme**.

The listing option, when specified, directs the compiler to produce an interleaved listing file. The listing file will be named **<x>.lis** where **<x>** is the base name of the input source file (for example, a source file named **xyz.sme** will result in a listing file being named **xyz.lis**). Compiler diagnostic messages will always be written to standard output, regardless of whether or not **-list** is in effect.

The SAMeDL compiler will generate interface files for each definition module (in the form of an Ada package specification/body pair) and each abstract module (in the form of a layered interface consisting of an Ada package specification/body pair, an Ada SQL Module file, and an Ada package specification/body pair generated from the Ada SQL Module). No interface files are generated for schema modules. All interface files will be placed in the SAMeDL library contained within the library directory.

Before using the compiler, the environment variable **XDBPATH** must be properly set to contain the path name to the XDB RDBMS installation directory (e.g., **/usr/XDB**).

Module Type	File Name	Description
Definitional Module	D_xxxxx.sme	Text file containing SAMeDL source code representing the definitional module
	P_xxxxx_.a	Generated Ada package specification file
	B_xxxxx.a	Generated Ada package body file
Schema Module	S_xxxxx.sme	Text file containing SAMeDL source code representing the schema module
Abstract Module	A_xxxxx.sme	Text file containing SAMeDL source code representing the abstract module
	P_xxxxx_.a	Generated Ada package specification file
	B_xxxxx.a	Generated Ada package body file
	E_xxxxx.sql	Generated Ada SQL Module file
	E_xxxxx.ada	Ada code for the expanded/compiled Ada SQL Module file

where **xxxxx** denotes a unique integer.

Diagnostics

The diagnostics produced by the SAMeDL compiler are intended to be self-explanatory.

8.2 sde.cleanlib

Command

sde.cleanlib - reinitialize a SDE library

Syntax

sde.cleanlib [*pathname*]

Description

sde.cleanlib will empty an existing SDE library of all compilation information. The command will re-initialize the **names.dbe** and **samedl.dat** files and remove the remaining contents of the **samedl.lib** directory from the directory specified by *pathname*; if *pathname* is not specified, then it will default to the current working directory.

Examples

The following sequence of commands cleans and re-initializes the library contained in the directory **/home/samedl**.

```
%cd /home/samedl
%sde.cleanlib
```

The following command does the same thing:

```
%sde.cleanlib /home/samedl
```

Diagnostics

An error is reported and no action is taken if *pathname* does not specify a valid, unlocked SDE library.

8.3 sde.creatlib

Command

sde.creatlib - create an SDE library

Syntax

sde.creatlib [*pathname*]

Description

sde.creatlib creates and initializes a new SDE library. It creates a directory named **samedl.lib** for the library in the directory specified by *pathname*. If *pathname* is not given, the current working directory is the default.

The command creates the files **samedl.dat** and **names.dbe** in the **samedl.lib** directory and sets the their information fields to an initial state.

Examples

The following sequence of commands creates a new SDE module manager library in the directory **/home/samedl**.

```
%cd /home/samedl
%sde.creatlib
```

The following command does the same thing:

```
%sde.creatlib /home/samedl
```

Diagnostics

An error is generated and no action is taken if *pathname* is not an existing directory or if the directory already contains an SDE library.

8.4 s

Command

sde.ls - list compiled SAMeDL modules

Syntax

sde.ls [*options*] [*module_name*] ...

Options

-ada_only	List only generated Ada interface files
-interface	List all generated interface files
-library *pathname*	Operate in the SDE library *pathname*. If not specified, will default to current working directory
-verbose	List file, file type, library entry date, source file name, and library file name.

Description

sde.ls provides a list of the SAMeDL modules compiled in the specified SDE library denoted by *pathname* (or the current working directory if *pathname* is not given). Options are provided to give more or less extensive information.

Specifying one or more module names gives information only on those modules; otherwise information for all modules in the library will be listed.

The options **-ada_only** and **-interface** are mutually exclusive. If both are specified, then **-interface** will be in effect.

Examples

The following command lists all (verbose) information for the modules **abs1** and **abs2** and their generated interface files from the library in the current working directory.

```
%sde.ls -v -i abs1 abs2

abs1
   Unit Kind: ABSMODULE
   Source File: abs1.sme
   Library File: ./samedl.lib/A_1.sme
   Time Entered: Feb 24 1992 11:59
   Interface Files:
      ./samedl.lib/P_2_.a (ADASPEC)
      ./samedl.lib/B_2.a (ADABODY)
      ./samedl.lib/E_1.sql (SQLMODULE)
      ./samedl.lib/E_1.ada (GENED_ADA)
```

```
abs2
   Unit Kind: ABSMODULE
   Source File: abs2.sme
   Library File: ./samed1.lib/A_2.sme
   Time Entered: Feb 24 1992 12:00
   Interface Files:
      ./samed1.lib/P_3_.a (ADASPEC)
      ./samed1.lib/B_3.a (ADABODY)
      ./samed1.lib/E_2.sql (SQLMODULE)
      ./samed1.lib/E_2.ada (GENED_ADA)
```

Diagnostics

An error is reported and no action is taken if *module_name* does not exist in the library, or if the library is not valid or is locked.

8.5 sde.mkscript

Command

sde.mkscript - generate an Ada compilation script file for an interface file

Syntax

sde.mkscript [*options*] *module_name* ...

Options

-library *pathname*	Operate in the SDE library *pathname*. If not specified, will default to current working directory
-output *filename*	Place the generated script template into *filename*

Description

sde.mkscript will create a template for performing the Ada compilation of the generated Ada files (and the units they depend on) for the definitional or abstract module(s) specified.

Examples

Suppose in the library **/usr/home/jdoe/my_lib** you have compiled the abstract module **my_abs** which depends (WITHs) the schema module **my_sch** and the definitional module **my_def**; **my_sch** depends only on **my_def** and **my_def** depends on no modules. Performing an **sde.ls** command gives the following information:

```
%sde.ls -v -a -l /usr/home/jdoe/my_lib my_abs my_def my_sch

my_abs
   Unit Kind: ABSMODULE
   Source File: input.sme
   Library File: /usr/home/jdoe/my_lib/samedl.lib/A_1.sme
   Time Entered: Feb 24 1992 11:59
   Interface Files:
      /usr/home/jdoe/my_lib/samedl.lib/P_2_.a (ADASPEC)
      /usr/home/jdoe/my_lib/samedl.lib/B_2.a (ADABODY)
      /usr/home/jdoe/my_lib/samedl.lib/E_1.ada (GENED_ADA)

my_def
   Unit Kind: DEFMODULE
   Source File: input.sme
```

```
      Library File: /usr/home/jdoe/my_lib/samedl.lib/D_1.sme
      Time Entered: Feb 24 1992 11:59
      Interface Files:
         /usr/home/jdoe/my_lib/samedl.lib/P_1_.a (ADASPEC)
         /usr/home/jdoe/my_lib/samedl.lib/B_1.a (ADABODY)

   my_sch
      Unit Kind: SCHEMAMODULE
      Source File: input.sme
      Library File: /usr/home/jdoe/my_lib/samedl.lib/S_1.sme
      Time Entered: Feb 24 1992 11:59
```

You may issue a **sde.mkscript** command to generate an Ada compilation template for compiling the Ada interface files associated with **my_abs** as follows:

```
%sde.mkscript -l /usr/home/jdoe/my_lib -o my_script my_abs
%more my_script
Compile (Source => "/usr/same/example/samelib/samedl.lib/P_1_.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/B_1.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/P_2_.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/B_2.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/P_3_.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/B_3.a");
Compile (Source => "/usr/same/example/samelib/samedl.lib/E_1.ada");
```

Diagnostics

An error is reported and no action is taken if *module_name* is not an abstract or definitional module or does not exist in the library, or if the library is not valid or is locked.

8.6 sde.purge

Command

sde.purge - remove out of date/unused files from an SDE library

Syntax

sde.purge [*pathname*]

Description

sde.purge will empty an existing SDE library of all obsolete or unused files. The command will remove all out of date (due to recompilation for example) or unused files (compiler temporary files or files associated with modules that have been removed via **sde.rm**) along with the library state backup file **samedl.dat.back** in the **samedl.lib** directory from the library associated with *pathname;* if *pathname* is not specified, then the SDE library will default to the curet working directory.

Note that, because **sde.purge** removes the library state backup file **samedl.dat.back**, an SDE library may not be restored back to its prior state once a purge is performed. Normally, library restoration would be accomplished by renaming the **samedl.dat.back** file to **samedl.dat** in the **samedl.lib** directory for the library. For example:

```
%cd pathname/samedl.lib
%ls samedl.dat*
samedl.dat       samedl.dat.back
%rm samedl.dat
%mv samedl.dat.back samedl.dat
```

Examples

The following sequence of commands purges the library contained in the directory **/home/samedl**.

```
%cd /home/samedl
%sde.purge
```

The following command does the same thing:

```
%sde.purge /home/samedl
```

Diagnostics

An error is reported and no action is taken if *pathname* does not specify a valid, unlocked SDE library.

8.7 sde.rm

Command

sde.rm - remove a SAMeDL module from a library

Syntax

sde.rm [*options*] *module_name* ...

Options

-force	Suppress the confirmation prompt and force deletion
-library *pathname*	Operate in the SDE library *pathname*. If not specified, will default to current working directory

Description

sde.rm removes all information and related interface files associated with the named module(s).

Unless the **-force** option is specified, the user will be issued a confirmation prompt for each module to be removed. The user may respond with a **y** (or **Y**) if the module should be deleted; any other response will result in the module being retained.

Examples

The following sequence of commands removes the unit **abstract_mod** from the SDE library present in the directory **/home/samedl.**

```
%cd /home/samedl
%sde.rm abstract_mod

sde.rm:   Delete ABSMODULE abstract_mod?  [N]: y
```

The following command does the same thing but eliminates the confirmation prompt:

```
%sde.rm -l /home/samedl -f abstract_mod
```

Diagnostics

An error is reported and no action is taken if *module_name* does not exist in the library, or if the library is not valid or is locked.

8.8 sde.rmlib

Command

sde.rmlib - remove an SDE library

Syntax

sde.rmlib [*pathname*]

Description

sde.rmlib removes all information in the SDE library in the directory specified by *pathname* (the current directory is the default). It deletes all the files in the SDE library directory **samedl.lib**, and then removes the directory.

The user will be issued a confirmation prompt. The user may respond with a **y** (or **Y**) if the library should be deleted; any other response will abort the command and retain the library unchanged.

Examples

The following sequence of commands removes the SDE library present in the directory **/home/samedl**.

```
%cd /home/samedl
%sde.rmlib

sde.rmlib:   Delete ./samedl.lib?  [N]: y
```

The following command does the same thing:

```
%sde.rmlib /home/samedl

sde.rmlib:   Delete /home/samedl/samedl.lib?  [N]: y
```

Diagnostics

An error is reported and no action is taken if the library is not valid or is locked.

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